

INSTALLATION INSTRUCTIONS

Hotline

READ INSTRUCTIONS COMPLETELY BEFORE BEGINNING INSTALLATION

Mechanical Installation

⚠ WARNING: The standard HOTLINE In-Line Diesel Fuel Heater is designed to be used only with diesel fuels and diesel fuel/biodiesel blends up to 20% (B20). If the percentage of biodiesel exceeds 20%, the inner liner of the standard HOTLINE may begin to deteriorate (reference D.O.E. document titled *Biodiesel Use and Handling—DOE/GO-102006-2358*, third edition, September 2006). If you intend to use biodiesel blends in excess of 20% contact Arctic Fox LLC customer service (800) 654-5382 or (763) 972-2758 for information on biodiesel compatible models of the HOTLINE. Under no circumstances should gasoline, gasohol, or alcohol be used to blend diesel fuel. Gasoline is dangerous and alcohol will actually raise the cloud point of diesel fuel.

The objective of a HOTLINE installation is to warm the fuel going to the fuel filter, and may extend the effective operating range by approximately 20°F below the rated cloud point of the fuel. In extreme cold weather additional measures may need to be taken such as the addition of other fuel warmers or fuel blending

WARRANTY

The Phillips & Temro Industries and Arctic Fox warranty statements are located on the website at phillipsandtemro.com/terms

⚠ WARNING: To prevent damage to the heating element, the minimum bend radius for the HOTLINE is 6-1/2" (165mm).

1. Before removing the existing fuel line(s) you have selected for replacement with HOTLINE(S) make sure you have fittings and adapters to fit your engine, filter and tank set up.
2. Optional Limit Switch/Thermostatic Shutoff Kit # D3065-2338 (12/24 volt). If you have an engine that requires the high temperature limit switch, make sure there is enough room between the engine and the filter outlet to insert the limit switch tee assembly. A 90° elbow at the filter outlet may be helpful. The Arctic Fox adapter fitting, D3061-1612, fits typical Fleetguard and Racor filters. Secure the limit switch assembly swivel tee to the filter outlet fitting and reconnect the jumper hose to the other end of the tee. Before tightening the swivel nuts, rotate the switch to provide clearance and safe routing direction for the wires.
3. For a HOTLINE installation at the fuel filter inlet, a straight 7/8" O-ring to #10 SAE adapter is provided. It fits common Fleetguard and Racor filters. If the existing line goes all the way to the bottom of fuel tank, turn off the valve at the tank, disconnect the line and let it drain into a container. If there is no valve it will be necessary to transfer or drain the tank contents into a proper container or fuel tank. After draining and removing the existing line, connect the feed through-tee end of the HOTLINE to the fuel filter inlet. The other end goes to the splitter Tee (on dual draw systems) or to the tank. The HOTLINE hose should be routed inside the frame to protect it from cold as much as possible. If the fuel filter is in an exposed location, consider shielding or insulating it.
4. Secure the HOTLINE hose with nylon tie straps in a manner comparable to that used by the vehicle/equipment manufacturer.
5. Dual HOTLINES may be installed between the splitter-tee and dual tanks.
6. Inspect the completed mechanical installation to make sure no hose is kinked or rubbing a sharp edge. Re-torque all connections to ensure "no vacuum leaks". Proceed to ELECTRICAL INSTALLATION directions.

Electrical Installation (12V and 24V)

⚠ WARNING: Never connect the heater element to a 110 volt source. The heater is a DC high current density device. Connection of the heater to a 110 volt AC source will result in its immediate failure and void the warranty.

⚠ WARNING: If the vehicle is equipped with an alternator having both 12 volt and 24 volt output terminals, be certain that the jumper wire is connected to the 12 volt output terminal of the alternator if you have a 12V HOTLINE.

⚠ WARNING: Under no circumstances should the HOTLINE assembly be shortened or otherwise modified.

1. Disconnect the batteries from the vehicle's electrical system before proceeding further.
2. Locate an area that is near the alternator and free from splash for installation of the circuit breaker*. The location chosen must be close enough to the output terminal of the alternator to permit connection to the circuit breaker terminals with the D3061-1638 (4 gauge) jumper wire. Connect the D3061-1638 jumper wire between the alternator output terminal and one of the circuit breaker terminals. Connection of the D3061-1638 jumper wire at the alternator permits monitoring of the vehicles electrical system in the usual fashion.

* This breaker limits the continuous load the installation will handle to 700 watts. If HOTLINE units required exceed this wattage, an additional circuit breaker and magnetic switch **must** be used.

3. Locate another area free from splash and within 18" (457mm) of the fuel filter or limit switch (if one is used) for installation of the magnetic switch. Mount the magnetic switch with the cap end down. Using D3061-1644 (10 gauge) jumper wire, connect the large terminal on the magnetic switch to the remaining terminal of the circuit breaker. The remaining large terminal is to be connected to a HOTLINE 10 gauge wire. On MODULAR HOTLINE, fasten the 3/8" ring terminal on a D3065—2360 jumper to the remaining magnetic switch terminal. Route the wire to the MODULAR HOTLINE location (fuel filter or tank) and cut to suit. Install a #10 crimp terminal provided but do not hook-up.
4. To complete the hook-up of power to the HOTLINE, a good ground connection is required. It is strongly recommended that the other HOTLINE wire/terminal be grounded to the engine block or flywheel housing bolt using a star lock washer to assure good contact. Use an appropriate size ring terminal provided. On the MODULAR HOTLINE, complete the hook-up at the unit by (a) slipping the #10 terminal end of D3065-2357 jumper through the D3065-2284 insulated boot (b) slip the magnetic switch jumper through the boot (c) connect both wires to the MODULAR HOTLINE terminals (d) slide the boot down the wires and over the top lip of the red fitting.

⚠ IMPORTANT: These connections *MUST* be made with the 10-32 screw, lock washer and nylon insert nut supplied. Tighten to 12 in. lbs. torque.

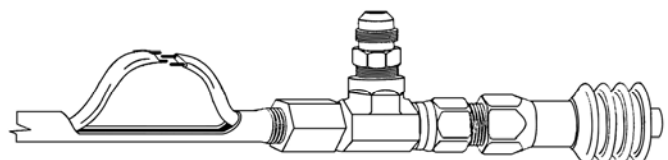
5. Install the lighted toggle switch on the truck dash in a suitable location. Drill a 1/2" (13mm) hole in the dash panel for the toggle switch and insert switch through the hole from the back side. Jam nuts are provided.

6. The shell connector of the D3061-1629 chassis Harness and D3061-1659 cab harness should be plugged into one another with the connection made inside the cab. The cab harness can then be routed behind the dash to the area of the instrument panel in which the toggle switch was installed.
7. Feed the ring terminal end of the chassis harness through a rubber grommet hole in the toe board or firewall to the magnetic switch (and limit switch) and connect as shown in the diagram.
8. Connect the D3061-1659 cab harness to the toggle switch as shown in the diagram
9. Connect one of the D3061-1677 jumper wires from the toggle switch terminal #3 to a ground such as an instrument panel screw or instrument hold down screw. Ground the ring terminal on the harness white wire to the same screw. Locate the circuit breaker or fuse panel inside the cab. Select a breaker or fuse that is not heavily used and which is controlled by the ignition switch. If a circuit labeled "switched accessories" is located, it should be used. Make the control power connection from the circuit breaker or fuse to the switch terminal #1, using the D3061-1677 jumper wire.
10. Special instruction for adding a high temperature limit switch thermostatic shutoff to an existing HOTLINE installation.
 - a Disconnect batteries as in step 1.
 - b Install the limit switch a per "Mechanical Installation" instruction step 2.
 - c Remove the white and orange wires from the small terminals on the magnetic switch.
 - d Cut the ring terminals off the orange and white wires and replace them with 1/4" blade terminals. Connect the blade receptacle terminals from the limit switch to these wires: Orange to Red and White to White.
 - e Connect the Blue wire and White wire, both with ring terminals to the small terminals on the magnetic switch.

⚠ CAUTION: If the Blue wire is grounded (while batteries are hooked up) it will blow the fuse on the red (power) circuit.

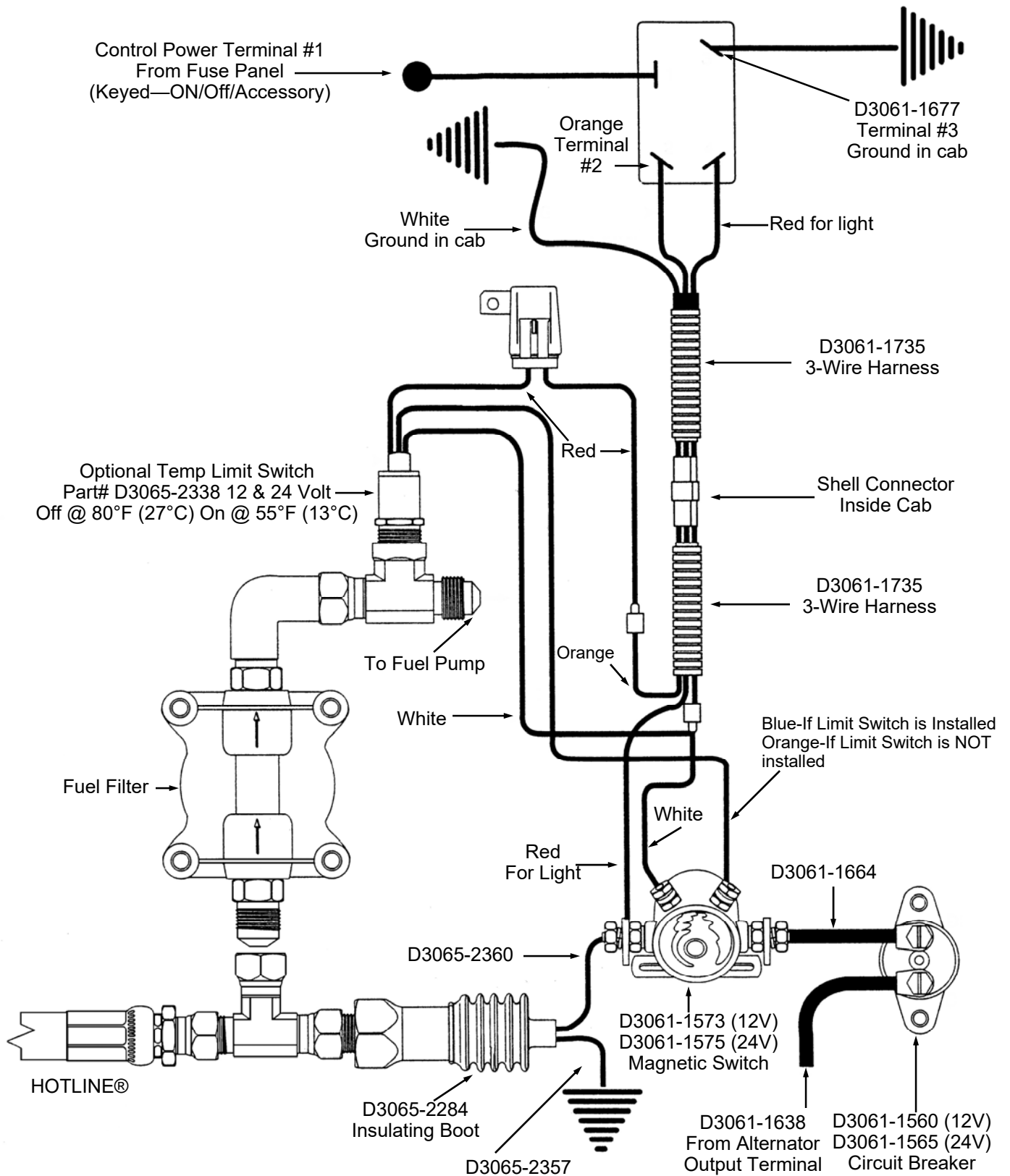
- f Snap some convoluted plastic tube over the exposed wires for protection. Refer to the wiring diagram and check your wiring.
11. Proceed to the testing section of these directions. **SECURE ALL WIRING INSTALLED USING NYLON TIE STRAPS, AVOID SHARP EDGES AND SOURCES OF EXCESSIVE HEAT.**

The HOTLINE is designed to be used with diesel fuel line applications. This product is not to be used with any other fluids such as gasoline, propane, hydraulic fluid, etc.



HOTLINE—In-Line Fuel Warmer—Wiring Diagram

(Showing Optional Limit Switch Connections)



TESTING

- A Turn the ignition switch on and start the engine. Operate the engine for a minute or two (to make sure that the fuel pump has not lost its prime and that the new fuel line is filled with fuel). Then turn the engine off.
- B Turn the ignition switch on again, but do not start the engine.
- C Activate the HOTLINE with the dash switch. The switch should light up indicating proper operation of the control circuit.
- D Observe the ammeter. An initial current discharge of as much as 70 to 100 amps should be indicated (the colder the ambient temperature, the higher the reading will be). This reading should decrease after a minute or so of operation as the heater decreases its power requirements in response to the rising temperature of the fuel in the line. The current indicated by the ammeter should decrease to a value of **45 amps or less** for the 600 watt heater, **31 amps or less** for the 450 watt heater, **21 amps or less** for the 300 watt heater, and **10 amps or less** for the 150 watt heater. A reading which does not decrease after several minutes of operation (with the engine not running) is indicative of a short somewhere in the system.

If the vehicle is not equipped with a functioning ammeter, it is recommended that a portable 0-150 amp ammeter be inserted (temporarily) into the heaters primary power circuit for the above test. Sustained electrical current requirements vary based on the fuel temperature and the fuel flow rate of the engine. The chart below shows maximum sustained electrical current draw and the recommended minimum alternator for the various wattage HOTLINE kits.

HOTLINE WATTAGE	MAXIMUM SUSTAINED ELECTRICAL CURRENT DRAW		RECOMMENDED MINIMUM ALTERNATOR RATING	
	12V	24V	12V	24V
600 Watts	45 Amps	23 Amps	105 Amps	80 Amps
450 Watts	31 Amps	16 Amps	85 Amps	70 Amps
300 Watts	21 Amps	11 Amps	75 Amps	55 Amps
150 Watts	10 Amps	5 Amps	75 Amps	45 Amps

⚠ NOTE: It is normal for the HOTLINE to show substantial amperage draw for the first 30 seconds after it is turned on (approximately double the normal load). After this the electrical draw will vary based upon the fuel's temperature.

We recommend that you review your existing electrical load requirements to determine the proper alternator rating for your use. Alternator ratings above the minimums recommended may be appropriate.

If the installation has the temperature limiting switch, the fuel must be cooler than 80°F (27°C) on order for the cab switch and HOTLINE to be energized. Check the temperature of the fuel in the tank before proceeding. To continue with the test if the fuel is above 80°F (27°C), you must (1) cool the fuel or (2) connect a jumper wire from the large terminal on the circuit breaker side of the magnetic switch to the blue wire terminal. To check for proper function of the temperature limiting switch you will have to cool the fuel filter below 55°F (13°C) to reset the switch.

⚠ IMPORTANT: Under no circumstances should the HOTLINE assembly be shortened or otherwise modified. The length of the assembly is absolutely necessary for the proper operation of the device.

Troubleshooting

No maintenance is required for the fuel heater itself. The magnetic switch, however, is an electromechanical device which will be operating in a relatively severe environment. Extreme cold weather conditions may momentarily require it to handle transient current loads in excess of the rated continuous local capacity. In the event of magnetic switch failure, it must be replaced. Lighter duty units or standard intermittent duty solenoids must not be substituted. The magnetic switch is mounted with the cap end down. **Use only Arctic Fox replacement parts.**

- 1 If the heater fails to function as described in the testing section of these instructions, check the electrical installation for a short or poor ground. If the wiring appears correct, test the magnetic switch and/or the circuit breaker. Remember, if the HOTLINE was properly installed, a lighted dash panel switch indicates power to the HOTLINE.
- 2 Make certain both the ignition switch and the fuel heater control switch are in the off position.

- 3. Disconnect the HOTLINE feed through wire attached to one of the 3/8" terminals of the magnetic switch.
- 4. Using a volt-ohm meter, test for power at:
 - A Alternator output terminal.
 - B Both terminals of the circuit breaker.
 - C The 3/8" terminal of the magnetic switch connected to the circuit breaker by the 10 gauge jumper wire.
 - a. A vehicle electrical system problem is indicated by lack of power at the alternator output terminal.
 - b. The circuit breaker is activated and the circuit open, or the circuit breaker is defective and should be replaced if power is present at only one of the circuit breaker's terminals.
 - c. If no fault is found by the above tests, move to the next section of these instructions.
- 5. With the wire still disconnected at the magnetic switch, turn the ignition switch and the dash switch to the on position. You should hear an audible "click" from the magnetic switch.
 - A If the magnetic switch appears to be functioning (indicated by the "click"), test for power at the 3/8" terminal to which the HOTLINE feed through wire was connected. If power is detected, check first for a poor ground connection on the HOTLINE, or broken feed through wire. If the ground connection and feed through wire check out OK, the problem is a defective HOTLINE unit.
 - B If power is not available at the terminal and the switch appears to be operating, the switch is defective, and should be replaced.
 - C If the switch does not appear to be functioning, the problem most likely will be found in the control circuit, which is discussed in step #6.
- 6. To test the control circuit, the ignition switch and HOTLINE dash switch must be in the off position. Using a volt-ohm meter check circuit continuity as follows.
 - A Remove the wire from the terminal at the top of the toggle switch (terminal #3). With the ohmmeter, check for continuity from this wire to a ground location. Replace the wire on the terminal.
 - B Remove the wire from center terminal (Terminal #1). Check for power at WIRE. This wire should only be powered when the ignition switch is in the on position. Replace wire.
 - C Remove the orange wire from the bottom terminal of the dash switch (Terminal #2). Perform the following tests.
 - a. Check for continuity from the terminal when the ignition switch and the dash switch are in the on position.
 - b. Check for continuity from the WIRE to the #10 stud on the magnetic switch. If an open circuit is indicated (no Continuity), the problem is within the connection between the CHASSIS HARNESS (D3061-1629) and the CAB HARNESS (D3061-1659) or a break in one of the harness wires.
 - c. While the orange wire is still connected at the dash switch, check for continuity between the second #10 stud on the magnetic switch (orange wire) and a ground inside the cab (white wire). Replace the wire on the switch after this test.
- 7. The red wire connected to the outlet side of the magnetic switch is used to light the toggle switch lamp when the power is on.

⚠ NOTE: The HOTLINE is a key element of the total cold weather package of your vehicle. It is designed to operate off the vehicle's electrical system to keep your fuel line unfrozen between the fuel tank and fuel filter. Because diesel engines have cold weather weaknesses, we recommend the HOTLINE be used in conjunction with other cold weather products such as ether injectors, block heater, fuel tank heaters, battery warmers and chargers to provide complete protection.